Present-day tendency in the design of German printing machines

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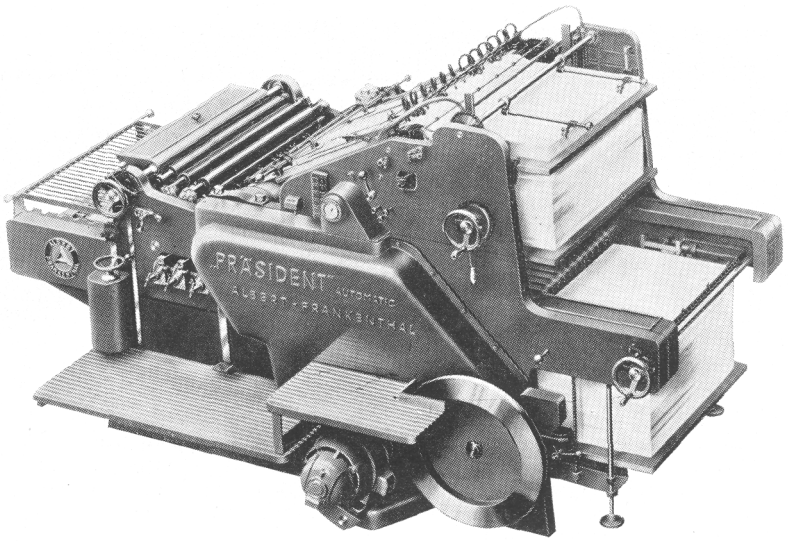
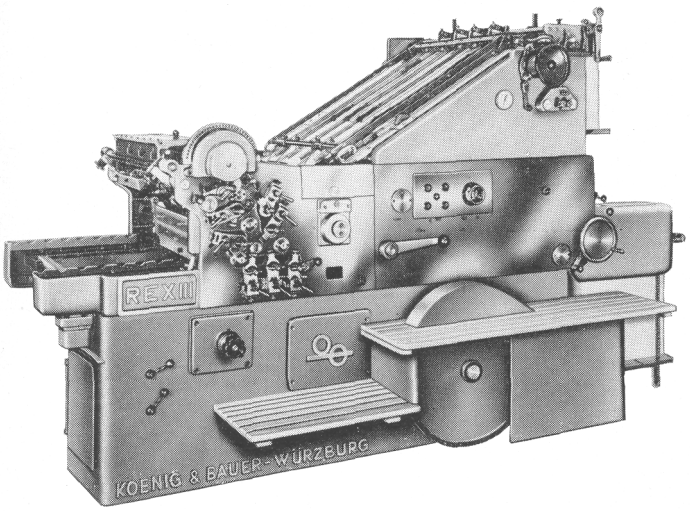
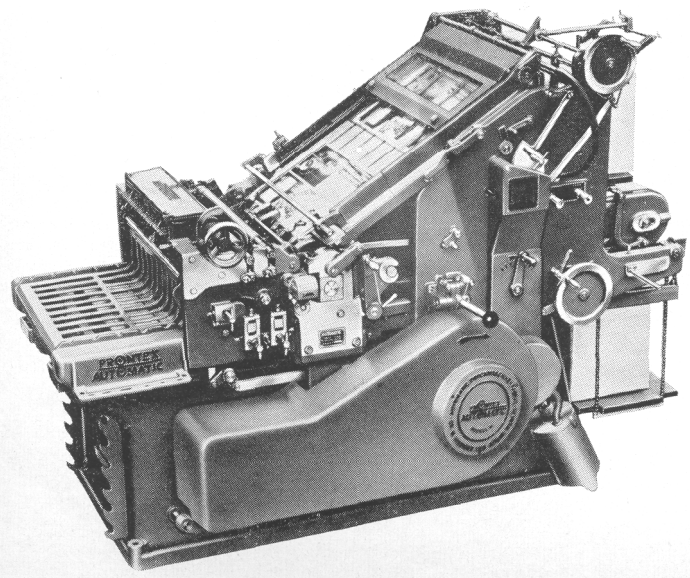
Dr. Wolfram Eschenbach



At the beginning of the 19th. century as the German engineer Friedrich Koenig introduced the prototypes of the present-day high-speed presses he laid the foundation on which all later printing machines were built. Thanks to the untiring work of its salesmen and its designers the German printing machine industry has held a leading position in the world for a number of years and the vast range of machines shown at the DRUPA in 1954 showed international experts from all branches of the industry that German machines are still leading both in design as well as in performance. The most outstanding feature of this exhibition compared to earlier held was that it showed explicitly the many important refinements which have been made to the design of various constructional elements. Those printing shops specialising primarily in really high class work were offered a full range of really high-precision machines and tools to ensure a maximum degree of working accuracy. An extremely large number of German printing machines and auxiliary machines will be on view at the coming IPEX show in London with the object of giving both the buyer and the user a chance to compare and test German machines with those produced by other countries. The rapidity with which the one exhibition followed the other means, naturally enough, that one cannot expect any revolutionary or outstanding new developments but even so many of the older and reliable types of machine have been very carefully improved and modified with the idea of even further increasing their performance.





The object of this article is more to give the visitor to the exhibition a few pointers about what will be on show and to indicate one or two of the major points to be looked for when comparing this or that machine with other similar types made in other countries. Finally it is hoped to show our readers what direction the present-day tendency is taking.

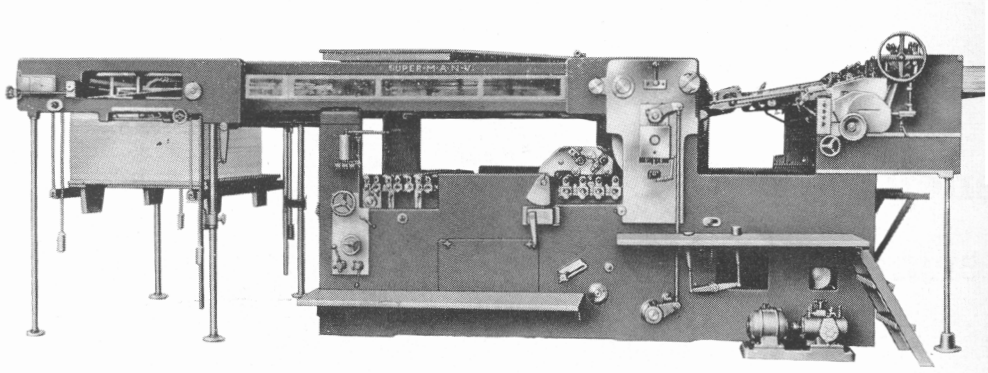
The present-day high standard — incidentally this is featured primarily for the extremely high performance both qualitatively and quantitively, by the extreme economy of the whole printing process and by the extensive use now made of multi-colour printing — was only possible through extremely close cooperative work between the machine builders, the actual printers and, in more recent years, the various research organisations. The many new and interesting types now available to users could only be designed after a large number of complicated printing and reproductional problems had been solved and only by exploiting to the full the vast knowledge and the vast improvements made in machine engineering in general and applying the knowledge gained to the design of printing machines. The intense competition between the various printing processes was most necessary and essential for it, alone, has been responsible for the high state of perfection reached by many machines.

The visitor to the coming IPEX show should not expect to find a series of "sensations" in fact, quite the opposite he will be met by a series of machines which have been slowly but surely brought to a state of perfection and which, in many cases, have been even further improved by the addition of new accessories. The printer of today looking for a speedy and economically operating machine which, apart from saving him space, is attractive in appearance will soon find that the manufacturers concerned have done everything in their power to give him a machine which can be used for non-stop printing of all kinds. His main job, after procuring such a machine, is to ensure that idle and non-productive times are cut down to a mininum

Top: A stop cylinder automatic with base made from a single casting. This is a pushbutton controlled full automatic to take paper in sixes 24 × 36 or 26 × 38" and with a speed of up to 3,000 sheets per hour. This has been given the name "Praesident Automatic". Built by Messrs. Schnellpressenfabrik Frankenthal Albert & Cie. AG of Frankenthal/Pfalz (Company photo)

Centre: A stop cylinder automatic, a universal type of machine with accelerated return and paper feed from a large pile. Size of paper 22 × 30" and with an hourly capacity of up to 3,600 sheets. This is the type "RexIII". Built by Messrs. Schnellpressenfabrik Koenig & Bauer AG of Wuerzburg (Company photo)

Left: The "Frontex Automatic" stop cylinder automatic, a powerful and universal type of high-speed press to take paper in sizes of 26 × 38" or 27½ × 40". The maximum speed of this machine is 3,000 sheets per hour. Built by Messrs. Druckmaschinenfabrik W. Hinniger & Soehne of Berlin NW 87 (Company photo)



A two-speed high-speed printing press with extra high printing pressure. Both a roller and table inking mechanism is provided. This "Super Man" machine is laid out with fully-automatic pushbutton control. Built by Messrs. Maschinenfabrik M.A.N. Augsburg-Nuernberg of Augsburg (Company photo)

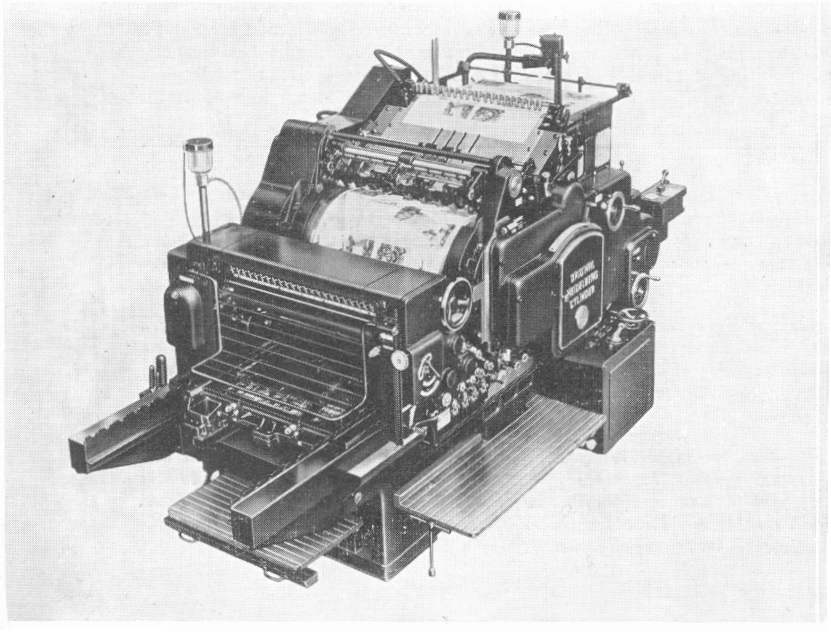
— thisis possible by preparing forms as accurately arid exactly as possible — so that his new machine is exploited to its full economic capacity. Incidentally it must not be forgotten that the operator of such a machine requires a certain amount of mechanical knowledge and, a most important point, the machine must be correctly assembled and erected.

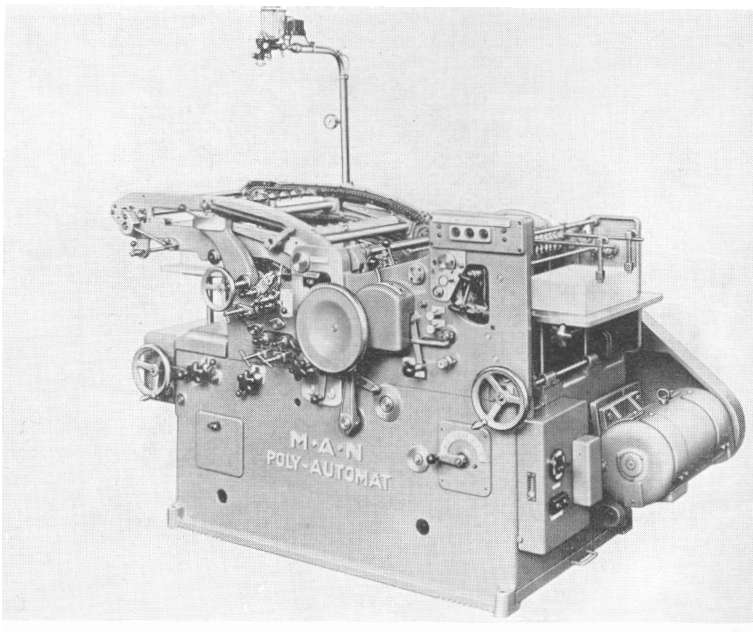
Before approaching the subject of what has been newly introduced into the printing machine world it would be as well perhaps, if we bring home the following point — an excellent print is, at all times and without exception, the direct result of harmoniously combining the four variable factors viz printing block or form, ink or colour, material on which the print is made (normally this is paper) machine and printer. The main job of the printer is to ensure that each and every one of these individual components harmonises optimally with the others. For instance the characteristic printing block or form required to carry out a printing process of some kind is made, nowadays, of metal or plastic and must have a useful service life aslongaspossibleand a screen or raster correspondingto the paper being used. Apart from giving perfect coverage the ink used must have a viscosity suitable for use with the block and the paper added to which it must possess certain drying and absorptive properties and a good adhesion. The paper used must be the best possible to reproduce the print added to which it must help ink absorption as much as possible and should not tend to tear easily, to powder or to crack. Finally the machine used must have an efficiently operating inking system, must be capable of feeding the paper correctly and have sufficient compression and the necessary printing speeds.

The main and obvious job of a printing machine is to transfer the printing ink to the material i.e. paper, being printed so that the impression obtained corresponds as near as possible to the original. The performance or better, capabilities of the machine i. e. its contact or surface pressure and its printing speed depend, on the one hand, on the size and shape of the print and the type of printing process and, on the other hand, to the block, the thickness of the coating, the ink used, the paper and the temperature of the room in which printing is being carried out. Completely independent of the part played by bearings, drive and transmission, the torsional moment is dependent entirely on the maximum pressure, the diameter and the length of the impression cylinder, the speed of the rolls etc. etc. In addition to making prints in on or more colours many of the printing machines offered today have to carry out one or more additional operations including trimming, drying, folding, carrying, stitching, glueing, punching, embossing, perforating, fluting, numbering, carbonising etc. etc. which means that the machine designer has several different problems to solve it he is to produce a machine type ideal for the particular job in hand. His main job was, and still is, to produce a machine which, in addition to functioning correctly, is built strong enough to stand up to the highest strains and stresses likely to be imposed during printing.

First and foremost, the working accuracy of a printing machine is dependent on the accuracy and the surface quality of all guides and bearings used to hold the various machine elements and is even as dependent on a maintaining of the prescribed machining tolerances. All parts and guides etc. expected to assimilate stresses and moments of any kind must be designed strong enough to stand up to these extra loads — at the present moment research is being made in several German factories so that a study can be made of the deformation which takes place on heavily stressed and unstressed printing machines of all kinds. The quality of the finished work depends a great deal on whether or not the construction of the machine is rigid enough and whether or not it is liable to vibrate during the time it is working. Right from the very start a printing machine designer must concentrate a great deal of his efforts to eliminating the detrimental effect of natural oscillations and to providing ways and means of damping down all unavoidable vibrations. This is best assured by providing practically enclosed machine frames and twist-reducing box-like structures. It is most essential that cylinders and rollers be dynamically balanced and all the more important guides and ways as well as the various gear wheels must be hardened and micro-ground and, additionally, certain of the constructional parts used will have to be pre-aged in one way or another. Only the best quality ball and roller bearings may be used. All of these points are of absolute importance if a really high quality print is to be obtained on

Left: The "Original Heidelberg Zylinder" single-speed automatic laid out with constant printing speed and accelerated return speed. This model has four ink rollers and takes paper in sizes of 21 × 28". Maximum speed is some 4,000 prints per hour. Built by Messrs. Schnellpressenfabrik AG of Heidelberg (Company photo) Right: A two-speed "Poly" automatic. This is a small high-speed press for 14 × 20" paper and printing speed up to 5,000 prints per hour. The elevator table can be swivelled. Built by Messrs. Maschinenfabrik M.A.N. Augsburg-Nuernberg AG. of Augsburg (Company photo)



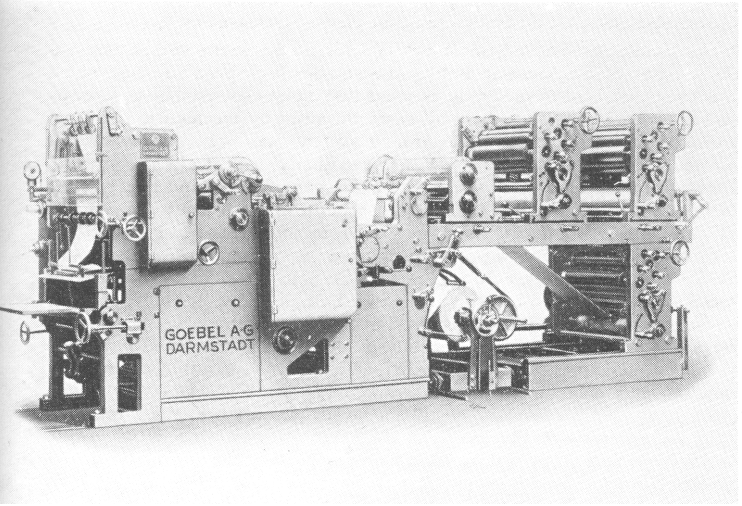


the machine being used and, obviously enough, nearly all of these points cannot possibly be determined by a potential buyer simply by superficially looking at the machine or simply by making a cursory examination.

The following are some of the more important features now demanded of a first-class and up-to-date type of printing machine.

1. Quality and performance, reliability

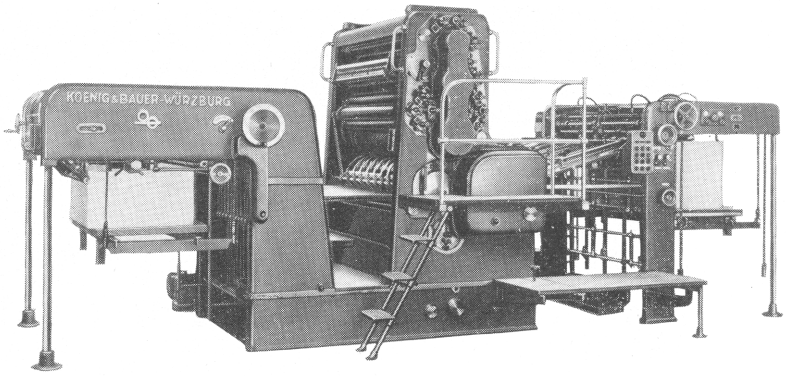
It is obvious enough that, in the long run, only well-tried machines which are fully capable of standing up to hard work and which have been built as rationally as possible can be sold to an expert printer. The usefulness of such a machine is measured by its productive performance i. e. in both quality and quantity, by its ease of operation and by its reliability and potential service life. The expert user of today demands above all else that the paper feed from and to the machine be uniform and positive at all times and under all conditions. Some of the latest equipment in this field includes automatic sheet feeders using a swinging device and with pre-alignment of the pile of sheets, sheet feeders and sheet lifters from large stacks of paper, spring-loaded compensating rollers with hydraulic shock absorbers (used in rotary machines only) roller brakes, pre-tensioners, register rollers etc. The user also demands a stronger than earlier printing system which is easily accessible for repair or assembly purposes, plus an inking system laid out to meet the requirements of the printing process and to finely grind the ink being used and to spread this evenly over the whole printing surface. On certain types of rotary machines the ink is transmitted by spirally-cut rollers or by an ink spraying attachment of some kind or other. High speed machines available on the market today are provided with pump-fed inking systems, the pump being used to circulate the filtered ink. In more recent times rotary photogravure machines have been fitted with recording viscosimeters i. e. with a device to automatically control the viscosity of the ink being used at any time. The folding devices used



A special-type of small letterpvess rotary machine for printing endless forms and sheets. This universal type can be used to print 74 different form lengths and has a working width of 11¾, 19¾, and 23¾". The form cylinder has a maximum speed of 9,000 revs. per minute. This is the "Vari-Forma" type and is built by Mesers. Maschinenfabrik Goebel AG of Darmstadt (Company photo)

on such machines are expected to stand up to hard work for they have to fold the paper coming from the roll, cut and trim this, collect this together, glue and often stitch or staple these together. All in all such auxiliary devices must be designed to work at the same high speed as the printing machine. Nowadays users are even offered the services of cam controlled folding cylinders.

The electrical equipment used on a modern printing machine must also be up-to-date and capable of meeting the high demands made on the press itself. This applies not only to the drive units but also to the various, often complicated, control units. All in all, the electrical equipment fitted, on a machine determines whether or not the machine can be run profitably. On the drive side, the amount the motor can be overloaded, its torque characteristies and its speed characteristies i. e. speeds independent of the load, play a very important part. The most usually used are shunt-wound d. c. motors, three-phase slip-ring rotor motors or three-phase shunt-wound motors. The main demand made is that the machine starts up smoothly and speed regulation is made loss-free and infinitely variably. Fully automatic control systems can only be used economically on really large



The "Pax" high-pressure rotary sheet press with feed from a large pile and swinging type of gripper. The inking unit rotates always in the same direction. This type has automatic pile lowering and will take 34 X 47" sheets. The machine has an hourly output of 6,000 sheets. Built by Messrs. Schnellpressenfabrik Koenig & Bauer of Wuerzburg (Company photo)

machines more so as such complicated layouts are more liable to breakdown or trouble of some kind. A good picture of this is the electrical equipment used on a large high-speed rotary press.

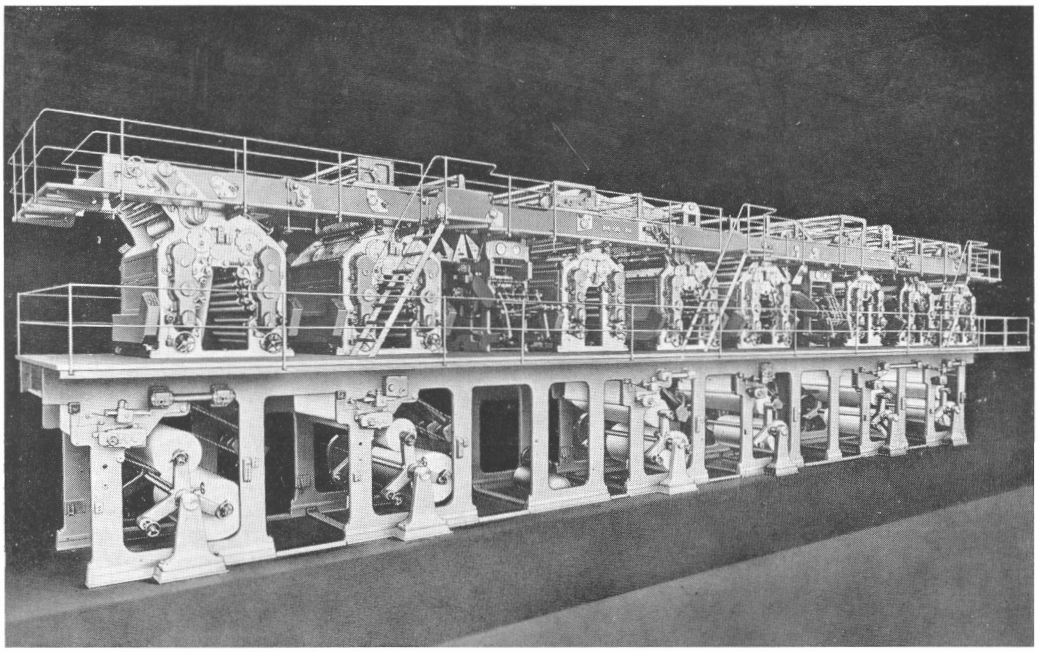
The various drive groups i. e. printing mechanism units, drive for the paper roller, folding apparatus etc., are nowadays coupled up by shaft drives, in other words the old fashioned long chains of spur gears have been done away with completely. The earlier used central drive unit has been sub-divided down into a number of smaller drive units-normally speaking one motor looking after each 16-page unit. This has only been possible by exploiting the distinct advantages offered by really high-class spiral bevel gears and ground gearwheel sets as well as fitting anti-friction bearings contained in dust-proof gearboxes. On these in-line types of machines, the shafts joining unit to unit can be dimensioned relatively small due to the reduced torsional moment and normally, these are only used to mechanically synchronise the various units and to balance out the difference in drive moments. Each of the individual groups can be simply and quickly uncoupled from the rest and equally as quickly engaged again. Even today it would, in all probability, be too expensive to synchronise the units electrically. The relatively small size of the various drive units means that they can easily be accomodated in the space available. The feed in of the paper for instance requires a regulation range of from 1:40 to 1 : 50 and, earlier, this problem was solved by utilising an auxiliary motor with reduction gear and overriding clutch. Nowadays it is more usual to use more reliable auxiliary three-phase shunt-wound collector motors (frequency converter giving an almost loss-free regulation of the speed) or d. c. motors with transformer. Here it should not be forgotten that there is a large diffreence in the load to be overcome by a cold and by a warm machine and the various printing unit combinations also set up different loads to be overcome by the motor. High importance is today placed on a quick braking of the revolving parts i. e. in from 4 to 5 secs. and, to this end, it is usual to fit the motors, printing cylinders and, quite often, the folder attachment cylinders with air brakes which give a gentle but nevertheless powerful braking action. The brakes themselves are controlled by magnetic switches and controls.

Obviously enough the various motors utilised on a modern type of rotary printing press are controlled over push-button switches of one kind or another. The control panel is often supplied complete with illuminated diagram and also contains panel controls marked i. e.-caution, feed forward, draw-in, operate, slower, faster, stop, safe, change rollers, ready etc. etc. A centralised control brings with it, amongst others, an extensive reduction in waste paper losses. Normally speaking the control panel containing the various switches--contactors, multi-point switches, instruments etc.-is mounted at a suitable spot away from the machine. In addition to several foreign register controls, great success has been gained with the newer type of photo-electric register control made by the AEG.

Quite a large number of electrical devices and equipment have been developed of late for a variety of different purposes i. e. to control the tension of the paper, to switch off at paper tearing, to heat the drying cabinets, safety devices on the folder unit, automatic paper glueing attachments, devices for signal and lighting equipment and other equipment to demagnetise the printed material. Even the auxiliary machines are now provided with a number of electrical devices i. e. heaters etc. for pneumatic casting machines.

2. Simplicity of operation and easy supervision

Whenever possible all controls shall be arranged centrally and handily. Above all else the inking mechanism must be easily accessible or must be arranged so that it can be swivelled outwards added to which the paper rollers, automatic paster, drying cabinet, folding mechanism etc. must all be easy to supervise. The modern types of dust-proof gearboxes are provided with automatically operating high-pressure lubrication. However, from



A newspaper rotary laid out on several layers with eight printers and six three-roller stars, the prototype of a modern high-speed press. This type is named the "Uusi Suomi-Helsinki" and is built by Messrs. M.A.N. Maschinenfabrik Augsburg-Nuernberg of Augsburg (Company photo)

a running overheads point of view any extensive automatisation of operation or electrical remote control must really be worth while and profitable.

3. Universal use

Even though designed with an eye to saving both space and weight, the machine must be constructed in such a manner that it has a large potential field of use. Nowadays universal types of machines are provided with a whole series of attachments and many reliable machines types are offered in a number of sizes. Many constructional parts are organically combined one with the other and quite a large number of the larger machines are prefabricated in such a manner and to such an extent that they can be easily converted and modified to various combinations. Generally speaking, however, foreign buyers in particular give preference to special machines laid out for one particular job.

4. Moderate prices

Amongst the various measures which have been adopted to make manufacture as economical as possible, first place is occupied by extensive standardisation followed closely by the full utilisation of a lightweight type of construction. Even though the price of materials used for this lightweight construction is reasonably high, their use offers quite a number of advantages to the foreign buyer i. e. lower freightage costs and import duties, simplification in the laying of foundations, reduction in running overheads etc. This reduction in the amount of material required together with the use of lighter than normal materials have played a large part in reducing manufacturing overheads. However lightweight materials cannot be used extensively at the expense of service reliability.

5. Pleasing design and safety from accidents

Providing other factors are equal, the modern-day buyer gives preference to that machine with a better external appearance and offering a maximum of safety. Accident-free operation has been obtained by enclosing all parts of the machine as much as possible, by positive closing of the plates on rotary machines, automatic stopping of the machine even during setting up and cleaning. Nowadays. from a hygienic point of view it is essential that the drying unit be enclosed.

6. long service life due to a minimum wear, noiseless running even at high speeds

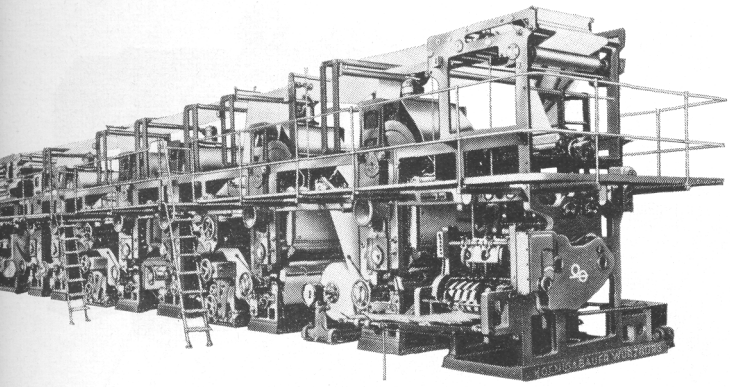
Before being taken over a printing machine should be subjected to a series of standard tests similar to those applied to machine tools. In addition to making a test with the machine running both off and on load after it has been erected by the manufacturers, all machines in use should be periodically subjected to a routine check to ensure that their reliability and performance are up to par.

The extremely sharp but fruitful competition between the various printing processes has led to the introduction of a host of varied machine types each with its own peculiarities. Before dealing with some of the individual types it should be pointed out that about 60 percent of all German machines made are being exported and, due to this fact alone, the designers of such machines have borne in mind the various requirements of foreign users and the different conditions existing in countries outside of Germany. This is particularly important from a point of view of formats and sizes.

In the letterpress printing machine field for instance one comes across a whole series of machines including the smaller highspeed presses, which have been perfected to such a degree that they must be looked upon more as printing automatics. In nearly all cases the printing mechanism has been improved and strengthened, the inking system has been improved and, as often as not, is arranged to swivel out, finally, a centralised control is provided for the cylinders as well as for the paper feeder and paper layer. There seems no doubt at all that the old, reliable cylinder printing machines will retain their popularity for a long time to come this being due in the main to their relatively low purchase price and easy operation-particularly when provided with an accelerated return. Perhaps the greatest competition to this type is liable to be a highly-efficient single-speed machine, a small, two-speed automatic and a rotary sheet printing automatic. The larger format stop cylinder printing machine is now being threatened by newer two-speed machines. Due to their particularly favourable method of working, from a technical point of view, and due to the fact that in the future one can look forward to an improved performance, these machine types are sure of a ready sale. No doubt at all a two-speed two-colour machine will be warmly welcomed in Europe. Most of the automatics made available today are series produced with the result that it has been posiible to reduce the price of such a machine at the same time increasing the quality of the finish. In more recent times the so-called rotary sheet printing presses have been given a great deal of attention. As is well known these machines have no return movement. A long period of research and development work was necessary before these machines could be marketed but now such a type has a far higher output per hour than has a high-speed press even though it operates at the same speed. This type is the counterpart of the offset sheet printing machine and is promised a great future in all cases where 20,000 prints and more have to be run-off periodically. Naturally enough such machines-"Rotaman", "Pax" etc.-are fitted with a rocker gripper, first-class inking unit and large-pile sheet feeder apparatus etc. and, in one case, even with replaceable cylinders. The form cylinder is laid out to take stereos, electrotypes or plastic blocks and to give an hourly output of some 6,000 sheets. These machines are also available for two-colour printing as well as for first form and second form work.

We have dealt above with those rotary letterpress machines used for multi-colour newsprint work of all kinds. All of these machine types are featured for their smooth, uniform action together with a high performance even though their operation is simple and supervision easy. Other points speaking for their use are a relatively low power requirement, low lubrication oil consumption and small space requirements. The spiral bevel gears used to drive the forged steel cylinders are contained in an oilbath gearbox outside the side frame of the machine.

At the same time those stereotype machines used for circular or rotary stereotype work have been brought up-to-date and nowadays a printing shop is offered the use of semi or fully automatic casting machines as well as hydraulic matrix cutting presses with pressures up to 500 tons and plate processing machines all with an excellent quality and supplied by a number of different companies. Outstanding types of aniline printers are now

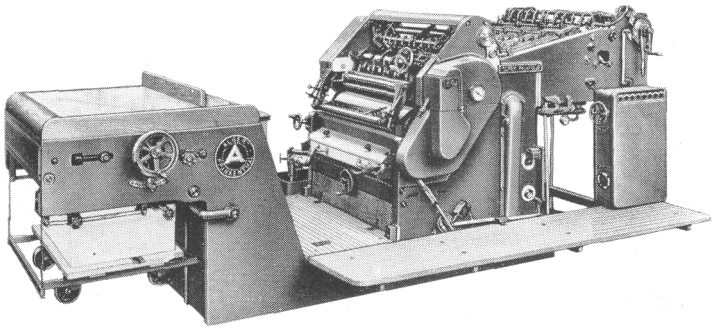


A multi-colour photogravure rotary press primarily for printing illustrated magazines etc. An in-line type of "Frankfurter Rundschau" machine with six printers, two variable folders and three paper roller stands. To run off a maximum of 40 pages and with commutator type main motors. Built by Messrs. Schnellpressenfabrik Koenig & Bauer of Wuerzburg (Company photo)

extremely popular for the printing of packaging and packing materials of all kinds. Unfortunately space does not permit us here to go into details of the vast number of auxiliary machines and attachments which have been developed for use with all kinds of printing processes. These include amongst others, appliances and apparatus for reproduction work, to make forms and to set forms, photo-electric block engraving equipment etc. etc. In the same way it is impossible for us to deal with the older reliable special types of machines made in Germany to print forms, tickets etc., for printing stamps and bonds etc. as well as a large number of machines used to print packages and packings of various kinds and, equally as well, we cannot possibly go into details about the multitude of paper processing machines offered users.

In the photogravure printing machine field the steady advance in techique is marked by a series of admirably constructed machines. For example, an improved model of the old "Palatia" plate photogravure printing machine is now available for sheet printing. This type is looked upon by many as a really high-performance type of automatic. The "Rembrandt" sheet printing photogravure machine will multi-colour print up to 5,000 sheets per hour at only one passage through the machine. This is the proto type of the extremely popular multi-colour sheet printing machine. Within the last few years standard types of the small rotary photogravure machine have gained a great deal of popularity. In addition to all the usual types now on the market, the squat "Regina" model is well worthy of our attention if only for the fact that the drying equipment is mounted in the frame under the actual printing system.

Photogravure machines are used extensively for the printing of illustrated magazines etc. and packaging materials of all kinds where, under normal circumstances, the material printed has to be dried quickly before it is processed further. The main object facing all designers was to increase the quality of the prints especially when running-off multi-colour work. A certain amount of difficulty has been experienced and still is being experienced in the making-up of the form. Many experiments and trials have been made with photogravure printing with pigmentless paper–incidentally this is promised a great future- and with autotype photogravure which is claimed as simplifying the whole process considerably. At the moment this "typographic" method of photogravure printing can be used only to produce work where a really perfect finish is not so important i. e. where a large series is to be run-off. The extremely high number of copies usually required today have caused designers to turn their attention to widening the normal photogravure machine-cylinder widths with six blocks is planned at some 6½ feet-and at increasing its printing speed up to some 18,000 prints per hour. Here again these high-speed types of rotary photogravure machines have been technically improved in a manner similar to a newspaper rotary i.e. they have been improved so that they will run efficiently for hours on end. Kowadays the older method of dipping the inking cylinder is no longer practical and several improvements in this respect have had to be, and have, been made. On the reversal type printers the doctor holder and the ink distributor attachment are replaceable one with the other and the doctor itself is raised pneumatically, the heater cylinder with its powerful air circulation as well as the cooler attachment are very liberally dimensioned, the first being controlled soley by adjustable thermostats. The printers themselves are fully enclosed and coupled up with a recovery system for the ink. Most of the machines are provided with an automatic paster and in addition to their standard photo-electric register control, are fitted out with an electro-magnetic stopping device and the inking system is also provided with an automatic device to control the viscosity of the ink. At the present moment designers are working on the problem of finding an instrument to indicate when

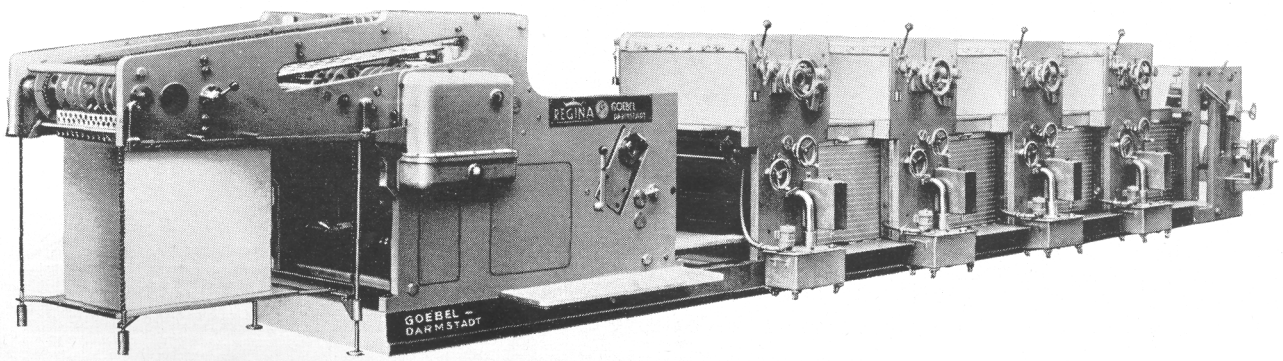


The "Super-Palatia O" high-speed photogravure printer to take 22 x 30" sheets. This is the representative type of the "Palatia" series of cylinder or plate printers. Built by Messrs. Schnellpressenfabrik Frankenthal Albert & Cie. AG of Frankenthal/Pfalz (Company photo)

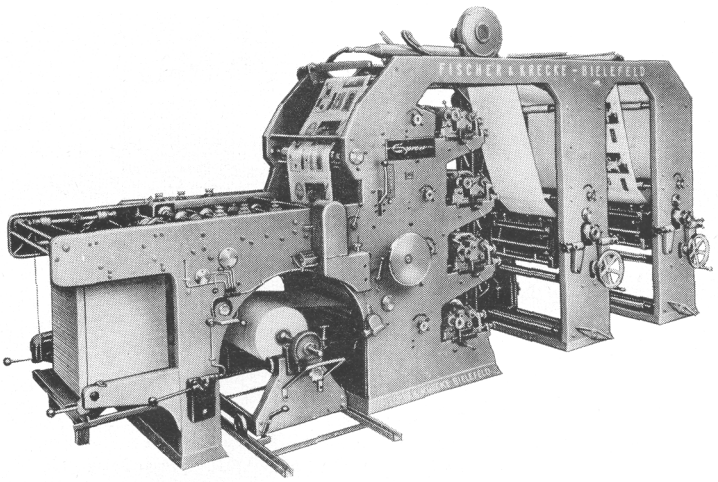
health damaging fumes from the solvents used are present in force in the workrom. A good example of performance is the photogravure rotary made by Messrs. Springer & Sohn of Hamburg which, in one week, will run-off two million 56 page copies.

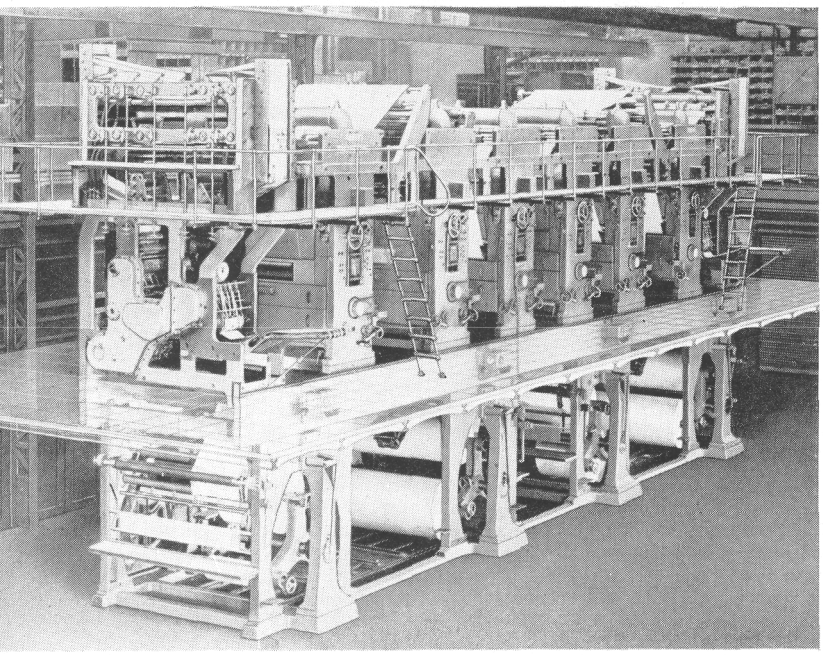
Though only in its teens so to speak, the German offset printing machine industry have achieved a large measure of success. The original machines built in the infancy stage i. e. normally these gave a poor print, difficulties were experienced in matching and the printing Plates were unreliable, have been replaced with really high-Perfomance types of machines built to give a very high degree of precision. A modern-day sheet printing

Bottom:
An in-line type of roller photogravure machine with the drying section of the machine under the actual printer. This "Regina" type is fully-enclosed and its maximum height is only some 63". Three types are available viz with widths of 19¾, 26½, and 31½". The deliver end can be fitted out as required. Built by Messrs. Maschinenfabrik Goebel AG of Darmstadt (Company photo)



machine will run-off up to 7,000 sheets per hour added to which the plates are good for at least 200,000 prints and with perfect registering during the whole time printing is being carried out. True enough no new types of offset rotary have made their appearance but against this, due to their vastly increased printing speed, the newer types of sheet rotary offsets have won for themselves a large measure of popularity. As is well known offset printing is an improved type of lithography which can now be carried out most economically due to the fact that modern technique has made it possible to produce plates with a longer useful life, due also to an improvement to the moistening and inking mechanism, to the development of special type offset inks and rubber sheets, by fitting the machines with high-speed continuously operating feeders and layers, finally, by reducing the scale of colours from 6 to 4. It has been possible of late to fit even smaller diameter cylinders than was possible earlier and the pre-aligning of the paper as it is fed means that it is laid-on perfectly. A system of chain grippers ensures that the printed sheet is led away from machine without any fear of smudging or smearing. Quite a number of the newer machines are laid out so that drive of the inking unit is not taken direct from the printer and all types are so designed that laying-on and outfeed as well as the feed of water and ink are easy to adjust and easy to supervise at all times. When making four-colour prints for instance, two-colour machines are coupled up together and the print passes through the one into the other. A so-called transfer cylinder is used to carry the sheet to the next pressure cylinder and from there over a chain-type gripper to the elevator. One type we have in mind is laid out with the drive units on the outer sides of the machine. In addition to this two machine method of printing four-colours, progressive printers' shops are nowadays offered the use of a four-colour offset sheet machine capable of running-off the four-colours at once and guaranteeing a perfect register. The sheets are printed in four colours on a common printing or impression cylinder and without a change of grippers. In the near future the same company hope to introduce a variable four-colour roller offset machine. To all intents and purpose remarks made earlier apply to this rotary machine as well. Again space prohibits us from going into fuller details of the smaller offset machines such as Rotaprint, Ozaplan etc. which have been improved so extensively of late.



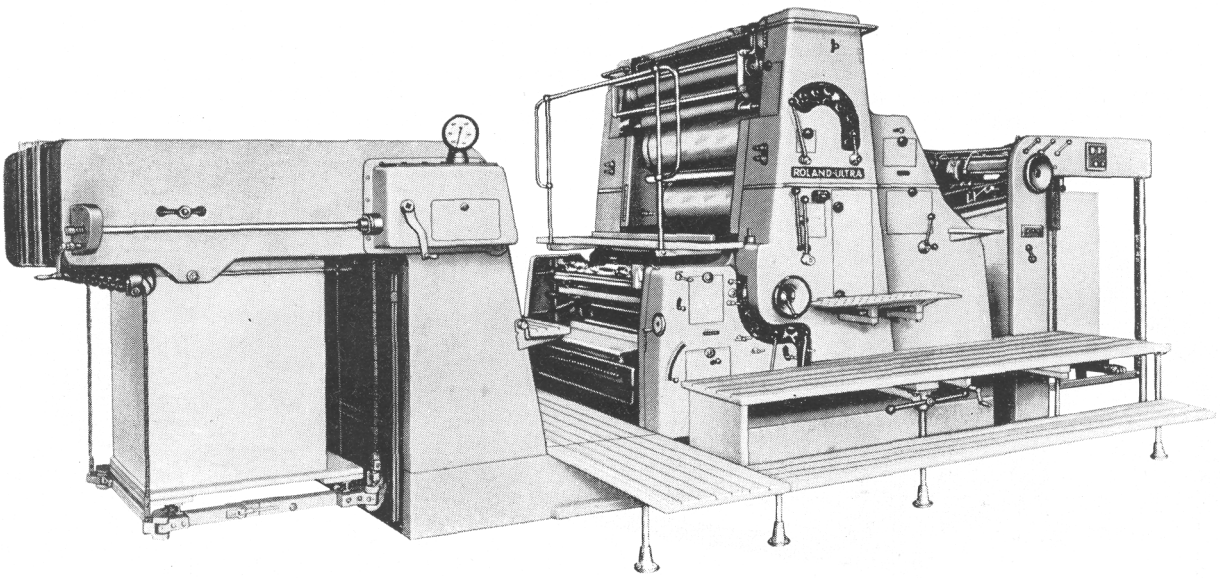


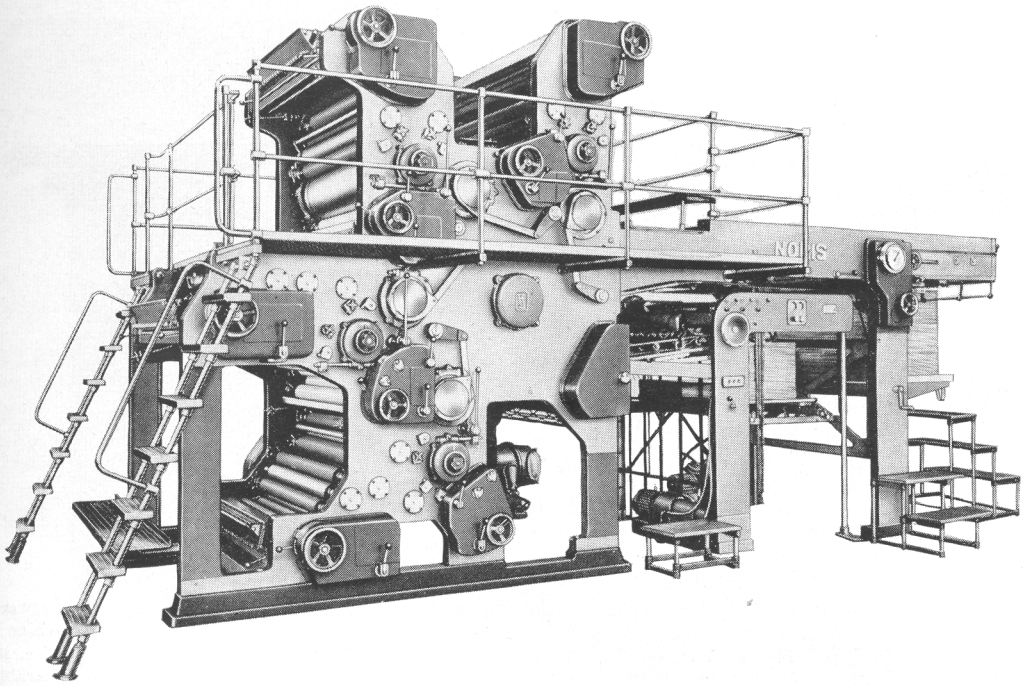
Summarising, we feel safe in saying that at the present time the German printing machine industry is in a sound position added to which the carefully thought out designs it has to offer shows that it has its eyes directed

Top:
A four-colour aniline printer combined with two photogravure cylinders, cross cutter and collector cylinder. The maximum working width available is 25½ and the machine is laid out with a variable spacing out of the prints and sheet lengths of from 8 to 20". This "Express" machine is built by Messrs. Maschinenfabrik Fischer & Krecke of Bielefeld (Company photo)

Left: A large multi-colour photogravure rotary press complete with six printers and two folders and laid out to take rolls of paper up to some 71". Built by Messrs. Schnellpressenfabrik Frankenthal Albert & Cie. AG of Frankenthal/Pfalz (Company photo)

Bottom: A two-colour offset press with gripper feed and swivel type colour box and with a roller blowing and washing device. This "Roland Ultra type RZU" machine is controlled over pushbuttons and is available in four sizes i. e. to take paper from 31 to 42" to 43 X 63" with hourly capacities from 6,800 to 5,800 sheets according to sheet size. By combining two of these machines together it is possible to print off four colours at one time. Built by Messrs. Faber & Schleicher AG of Offenbach/Main (Company photo)

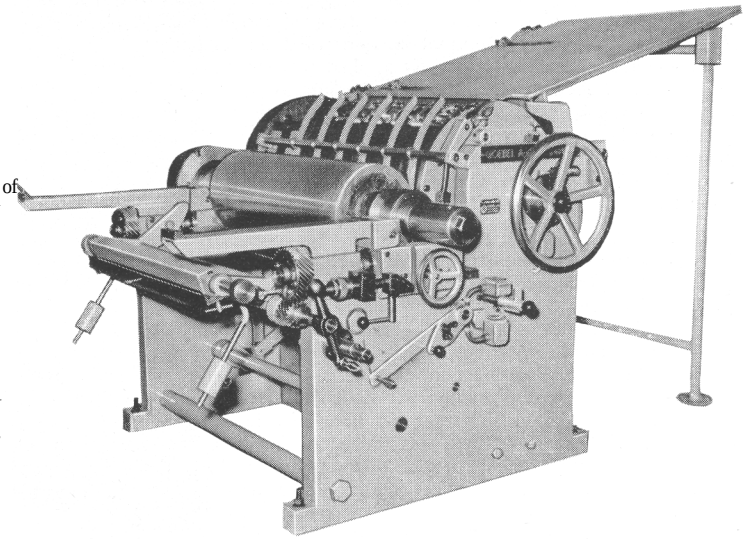




A four-colour offset machine. Here, the tour individual printers are arranged round a common pressure cylinder or roller. The sheets can be printed in four colours without requiring a gripper change. This "Noris" machine is built by Messrs. Maschinenfabrik Fruehwald & Jaeger of Nuernberg (Company photo)

on the future. In no way however, is development finished in this field. In the very near future the industry as a whole will be able to call on a store of young machine engineers passing out of the recently founded Printing Machine Institute attached to the Technical College in Darmstadt. In this way they hope to maintain their position as one of the leaders in the world printing industry.

The photographs accompanying this article are shown with the idea of giving our readers an idea of the progress which has been made. They are perfect examples of the creative spirit of the German printing machine engineer and designer and have been introduced mainly with the idea of making printing work more profitable. Finally may we point out that by far the largest proportion of Germanys' printing machine manufacturers belong to the "Printing and Paper Machine Section" of the German Manufacturers Association.



A pigment paper proofing machine, an auxiliary machine to help with the accurate printing of pigment paper sheets. The "Trabant" machine shown is built by Messrs. Maschinenfabrik Goebel GmbH of Darmstadt (Company photo)